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**PROGRESS REPORT OPERABLE UNIT 1 WASTE
PIT AREA JULY 1992**

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Fernald Project

Remedial Investigation/ Feasibility Study

PROGRESS REPORT

JULY 1992

Operable Unit 1 WASTE PIT AREA

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Introduction

The Remedial Investigation/Feasibility Study (RI/FS) is the blueprint for cleanup at the U.S. Department of Energy's Fernald Environmental Management Project (FEMP). The nature and extent of contamination at the FEMP and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented.

The FEMP has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Operable Units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup.

During the course of the RI/FS effort, certain conditions are occasionally identified which call for more immediate action. These actions are called "Removal Actions" and are initiated where there is a need to accelerate cleanup activities to address releases or potential releases of hazardous substances. Removal Actions are coordinated with the U.S. EPA and the Ohio EPA.

Following is a progress report on Operable Unit 1 including its history, the current status of RI/FS activities, cleanup alternatives under consideration, and work being done to alleviate near-term concerns.

Background

Operable Unit 1 includes the six waste pits, the burn pit and the clearwell. The six waste pits, built between 1952 and 1979, contain waste from past operations at the FEMP. No waste has been placed in any of the pits since the mid-1980s. Pits 1-3 are covered with soil. Pit 4 is covered with bentonite clay and a synthetic cover. Pits 5 and 6 are lined with synthetic membranes. The pits range in size from that of a football field to a baseball diamond and vary in depth from 13 to 30 feet. It is estimated that the six pits contain approximately 475,000 tons of waste, including uranium, thorium and other radioactive and chemical elements.

The burn pit, built in 1957, was used to burn laboratory chemicals and general refuse before it was taken out of service in 1970.

The clearwell was a settling basin for stormwater

runoff from portions of the waste storage area including Pits 1-3 and Pit 5. Sediment in the base of the clearwell is estimated to be 3.5 feet deep and contain concentrations of radionuclides and chemical constituents.

RI/FS Activities

Waste Characterization and Treatability: Chemical and radiological analyses of samples taken from materials in Waste Pits 1-4 and the burn pit are complete. This information is required to complete the Operable Unit 1 Remedial Investigation Report and treatability studies. Completion of these analyses represents the conclusion of the field investigations portion of the RI/FS for Operable Unit 1.

The waste material samples were analyzed at a U.S. EPA-approved laboratory to determine the concentration of radiological and chemical constituents in Operable Unit 1. This data is now being validated for use in RI/FS documents for Operable Unit 1. Validation of this data is expected to be completed in July 1992.

Data validation is a process in which a team of chemists, radiochemists, statisticians, quality assurance and other technical personnel, systematically review all aspects of data collection and laboratory analyses against an established set of criteria. Data validation is used to judge the quality and usefulness of the field and analytical data.

Samples of materials in the pits are being used for testing of waste treatment technologies currently under consideration, including cementation (stabilizing the waste with cement) and vitrification (transforming the waste into glass).

Waste stabilization studies continue at the IT Environmental Technology Development Center in Oak Ridge, Tenn. These studies involve mixing quantities of waste pit materials with differing amounts of cement and cement additives. Initial phases of solidification studies are complete, and this waste has been determined to be suitable for cementation. Each of the solidified waste forms from the treatability studies is subjected to a series of physical and chemical tests, including leaching the waste in acid, to arrive at the mix design which exhibits the best properties for retaining the physical

form and stabilizing the waste materials. DOE has completed Stage I of a three-stage process. Stage II is presently under way, and the entire study is on schedule for completion by July 1993.

Vitrification studies also have been initiated at the IT Environmental Technology Development Center. Representative samples from each of the waste units are being mixed with a range of materials, including flyash, and placed into high-temperature furnaces with the intent of forming glass. The study is intended to establish the best mix design which supports vitrification. While vitrification typically represents an expensive technology to implement, it provides many benefits such as improved immobilization of hazardous contaminants within a glass matrix and a reduction in waste volume. Vitrification studies on Operable Unit 1 wastes remain on schedule for completion by July 1993.

Samples of additional waste materials from Pits 5 and 6 and the Clearwell were obtained to support these ongoing treatability analyses. Up to eight 55-gallon drums of sludge from each waste unit were collected. This sampling activity was completed in February 1992. Some of the samples were transported to an off-site laboratory for treatability analysis. Remaining sample volumes have been archived at the FEMP for the purpose of supporting further treatability analysis in support of remedial design.

Radon Sampling Program: Consistent with the terms of the U.S. EPA's 1991 National Emission Standards for Hazardous Air Pollutants (NESHAP) Federal Facility Agreement, a sampling program was initiated in the waste pit area to measure the level of radon being released. The program involved a one-time measurement of radon release using Large Area Activated Charcoal Collectors (LAACC).

Approximately 100 LAACCs were placed on Waste Pits 1, 2 and 3. The LAACCs were left on the pits for 24 hours, removed and then sent to an off-site laboratory for analysis. Analytical results show radon levels on all three waste pits are well below 20 picocuries per square meter per second, the federal standard established by the U.S. EPA's NESHAP. The average levels calculated for Pits 1, 2 and 3 are 9.1, 6.4, and 2.6 picocuries per square meter per second, respectively. These measurements are deemed representative of the long-term average radon emissions that can be expected from the three waste pits.

Measurements will be conducted to verify that radon emissions from Pit 4 are insignificant due to the synthetic and clay cover. No measurements will be required on Pit 5, because all exposed material in Pit 5 will be distributed to below the water level as part of Removal Action No. 18 (Control Exposed Material in Pit 5). This work is proceeding on schedule. Pit 6 was not identified as a potential radon source, due to the insignificant radium-226

levels in Pit 6 waste. No measurements will be required on the clearwell due to its water cover.

Reports: The compilation of Operable Unit 1 Remedial Investigation and Feasibility Study reports is proceeding consistent with the schedules set forth in the 1991 Amended Consent Agreement.

Removal Actions

Waste Pit Area Runoff Control (Removal Action No. 2): The objective of this Removal Action is to collect and treat potentially-contaminated stormwater runoff from the waste pit area to prevent it from reaching Paddy's Run, a small stream which runs along the western boundary of the FEMP. This eight-phase Removal Action was completed ahead of schedule.

An existing culvert was upgraded and expanded to be capable of handling more water (Phase 1). A 30-inch storm sewer pipe 750 feet long was installed (Phase 2). An existing 48-inch culvert was plugged to reverse the flow of water to the upgraded culvert and the completed 30-inch storm sewer pipe (Phase 3). A new inlet control structure was constructed on the east side of the waste pit area (Phase 4). A temporary access road was provided northeast of the waste pit area (Phase 5). The new sump station and underground piping are in place (Phase 6). Construction of trench drains, storm sewers and a control structure on the north side of the waste pit area (Phase 7), and construction of a new standpipe overflow (Phase 8) have been completed.

This Removal Action provides runoff control, as well as a collection system, designed to collect stormwater runoff from the waste pit area and allow it to pass through the site's Bionitrification Surge Lagoon and the effluent treatment system prior to discharge from the site to the Great Miami River.

Completion of this project and the continued operation of stormwater retention basins will result in the capturing of a significant amount of additional stormwater runoff from the FEMP, thus minimizing the potential for release of contaminants to the environment.

Pit 5 Experimental Treatment Facility (Removal Action No. 11): This Removal Action involved the dismantling of the Experimental Treatment Facility which was built in 1984 to test the feasibility of thermal drying for sludge material from Waste Pit 5. The Removal Action included dismantling the greenhouse-type facility and packaging the building materials and sludge for safe storage pending final disposition. This project was completed March 22, 1992, ahead of the scheduled completion date of April 11, 1992.

Control Exposed Material in Pit 5 (Removal Action No. 18): The objective of this Removal Action is to eliminate the possibility of airborne contamination

resulting from exposed materials in the pit. A phased approach is being implemented using information obtained from Pit 5 liner repair activities; the pit berm investigation which addressed the pit's overall structural integrity; and the significance and magnitude of potential and actual emissions from the waste pit. The Removal Action will involve the repositioning of the exposed waste materials within the pit to provide for a continuous water cover over the residues. The DOE selected dredging as the method of transferring the material within Pit 5. EPA comments are currently being addressed and design work has been initiated. The Removal Action Work Plan was submitted to the U.S. EPA and the Ohio EPA on March 26, 1992.

Waste Pit Area Containment Improvement

(Removal Action No. 22): This Removal Action is designed to minimize the potential for wind or water erosion of contaminated materials from access roads and exposed surfaces in the Operable Unit 1 area. The work plan is due to the U.S. EPA August 31, 1992.

Other Activities:

Minimum Additive Waste Stabilization: The DOE has initiated a Minimum Additive Waste Stabilization (MAWS) program at the FEMP in conjunction with Argonne National Labs, Duratek, and Catholic University of America. The MAWS program is an innovative approach to combining vitrification, water treatment, and soil washing processes to potentially save millions of dollars in remediation costs through achieving waste minimization. The purpose of the MAWS program is to demonstrate that vitrification is an economical treatment alternative for the large volumes of low-level radioactive and mixed wastes present in Operable Unit 1.

The MAWS program is designed to blend pit waste materials with contaminated soils and, through the use of electricity, melt them into a glass for safe and permanent disposal. Vitrification results in a net reduction in the total volume of waste requiring permanent storage. Laboratory tests have shown that wastes from some of the FEMP's waste pits, when vitrified by themselves, do not make a good glass. However, when these wastes are blended with contaminated soils in correct proportions, tests have shown that a good, stable glass at reduced volume is achievable.

While vitrification has an initial higher capital cost than cementation, in the long run a cost savings can be realized because cementation actually adds to the total volume of waste that must be disposed of properly. Vitrification results in significant reductions in net volumes of waste and eliminates or

minimizes costly additives that otherwise would be required.

Presently, Catholic University of America, in cooperation with the DOE, is conducting bench-scale vitrification studies on samples taken from Operable Unit 1 waste materials. The MAWS bench-scale demonstration will process 0.3 to 1 metric ton of glass per day, then provide scale-up parameters for a pilot unit to process 20 metric tons per day. Eventually, full-scale facilities are planned to process glass at a rate of approximately 300 metric tons per day.

Activities presently taking place in support of MAWS include process design and procurement of equipment for installation in Plant 9. Compliance and safety documents are also being prepared. The contractor team will provide equipment, systems, technical and operating support for MAWS, both at the FEMP and at off-site locations.

Cleanup Alternatives

Five alternatives to cleanup the waste pit area have been identified.

The first alternative would involve stabilizing the waste in place, removing and treating standing water, and construction of a slurry wall, subsurface drains and a groundwater extraction system. This alternative would leave the waste in place, but would provide treatment of the waste and a system to prevent contamination from migrating into the groundwater.

The second alternative would involve removing the waste, contaminated soils and liner materials that surround the pits, from their current locations, and stabilizing or treating the waste, treating and discharging standing water, and permanent disposal of the stabilized/treated waste in an engineered structure at the Fernald site.

The third alternative is identical to the second, but with permanent disposal at an off-site facility.

The fourth alternative is similar to the second alternative and would involve removing the waste from the pits, but leaving in place and capping the contaminated soils and liner materials that surround the pits.

The fifth alternative is the same as the fourth alternative except the soils would be treated in place prior to capping.

More information about Operable Unit 1 is available in the Public Environmental Information Center (PEIC), where Fernald Environmental Management Project cleanup documents are kept in the Administrative Record. The PEIC is located in the JAMTEK building, 10845 Hamilton-Cleves Highway, Harrison, Ohio, 45030. The telephone number is (513) 738-0164.